

Appl. No. 10/517,222
Amdt. Dated May 26, 2009
Reply to Office Action of January 23, 2009

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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A solid state image sensor comprising:

a plurality of photo-conductive units which are arranged in rows and columns ~~each direction of the row and the column in the two-dimensional shape and which obtain a signal electric charge by receiving light;~~

a plurality of column electric-charge transfer units ~~unit~~ which transfer ~~transfers~~ said signal electric-charge obtained by ~~said photo-conductive unit in a the column~~ direction of ~~said column;~~ and

an electric-charge detection unit which is provided in correspondence with a ~~for every~~ plurality of ~~said adjacent columns~~ column electric-charge transfer units and which converts said signal electric-charge transferred by each corresponding ~~said column electric-charge transfer unit into a pixel signal;~~

~~wherein with respect to said plurality of adjacent columns, when said signal electric-charge obtained by a said photo-conductive unit at a the same row position transferred by the corresponding column electric-charge transfer units for a~~

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~~electric-charge detection unit in the direction of said row~~
reaches said corresponding electric-charge detection unit at a
different vertical transfer time, ~~a phase of the electric-charge~~
~~transfer is made different.~~

2. (Currently Amended) A solid state image sensor
comprising:

a plurality of photo conductive units which are arranged in
rows and columns ~~each direction of the row and the column in the~~
~~two-dimensional shape and which obtain a signal electric-charge~~
~~by receiving light;~~

a plurality of column electric-charge transfer units unit
which transfer ~~transfers~~ said signal electric-charge ~~obtained by~~
~~said photo-conductive unit in a the~~ column ~~direction of said~~
~~column;~~

an electric-charge detection unit which is provided in
correspondence with a ~~for every~~ plurality of said adjacent column
electric-charge transfer units ~~columns~~ and which converts said
signal electric-charge transferred by said each corresponding
column electric-charge transfer unit into a pixel signal; and

~~a dummy electric-charge transfer unit arranged between said~~
~~column electric-charge transfer unit and said electric-charge~~
~~detection unit, in which the~~ wherein a number of stages of
electric-charge transfer is different with respect to each of
said column electric-charge transfer units associated with a
corresponding electric-charge detection unit ~~plurality of~~
~~columns.~~

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3. (Currently Amended) The solid state image sensor according to claim 2, wherein

in the electric-charge transfer units of said plurality of adjacent columns, an electrode used for the vertical transfer drive is used in common.

4. (Currently Amended) The solid state image sensor according to claim 2, wherein

said electric-charge detection unit is provided for every two said adjacent columns.

5. (Currently Amended) The solid state image sensor according to claim 4, wherein

~~in said dummy electric-charge transfer unit, the number of stages of said electric-charge transfer is different to the extent that a phase of the electric-charge transfer becomes 180 degrees inverted between said two adjacent columns, when said signal electric-charge at the same position in the direction of said row is made to reach said electric-charge detection unit.~~

6. (Currently Amended) A solid state image sensor comprising:

a plurality of photo conductive units which are arranged in rows and columns ~~each direction of the row and the column in the two-dimensional shape and which obtain a signal electric-charge by receiving light;~~

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a plurality of column electric-charge transfer units unit which transfer ~~transfers~~ said signal electric-charge obtained by said ~~photo-conductive unit~~ in a the column direction of said column; and

an electric-charge detection unit provided in correspondence with a ~~for every~~ plurality of said adjacent column electric-charge transfer units ~~columns~~ and which converts said signal electric-charge transferred by each corresponding said column electric-charge transfer unit into a pixel signal, wherein signal electric-charge obtained by a photo-conductive unit at a same row position transferred by the corresponding column electric-charge transfer units for a electric-charge detection unit reaches said corresponding electric-charge detection unit at a different vertical transfer time ~~an electrode used for driving a vertical transfer is formed such that a phase of electric-charge transfer when said signal electric-charge obtained by said photo-conductive unit at the same position in the direction of said row reaches said electric-charge detection unit is different, when a common vertical transfer control signal is applied to said plurality of adjacent columns.~~

7. (Currently Amended) The solid state image sensor according to claim 1, wherein

said electric-charge detection unit includes a selective gate, ~~which is shared with said plurality of adjacent columns,~~ for reading out said signal electric-charge ~~on the input side of said signal electric-charge.~~

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8. (Currently Amended) The solid state image sensor according to claim 2, wherein

said electric-charge detection unit includes a selective gate, ~~which is shared with said plurality of adjacent columns,~~ for reading out ~~said signal electric-charge on the input side of~~ ~~said signal electric-charge.~~

9. (Currently Amended) The solid state image sensor according to claim 6, wherein

said electric-charge detection unit includes a selective gate, ~~which is shared with said plurality of adjacent columns,~~ for reading out ~~said signal electric-charge on the input side of~~ ~~said signal electric-charge.~~

10. (Currently Amended) The solid state image sensor according to claim 1, wherein

a wiring to ~~said a~~ selective gate is shared with ~~the wiring~~ ~~to said selective gate with respect to said electric-charge~~ ~~detection units of adjacent others.~~

11. (Currently Amended) The solid state image sensor according to claim 2, wherein

a wiring to ~~said a~~ selective gate is shared with ~~the wiring~~ ~~to said selective gate with respect to said electric-charge~~ ~~detection units of adjacent others.~~

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12. (Currently Amended) The solid state image sensor according to claim 6, wherein

a wiring to ~~said~~ a selective gate is shared with the wiring to ~~said selective gate with respect to said electric-charge detection units of adjacent others.~~

13. (Currently Amended) A solid state image sensor comprising:

a plurality of photo-conductive units which are arranged in rows and columns ~~each direction of the row and the column in the two-dimensional shape and which obtain a signal electric-charge by receiving light;~~

a plurality of column electric-charge transfer units ~~unit~~ which transfer ~~transfers~~ said signal electric-charge obtained by ~~said photo-conductive unit~~ in a the column direction of ~~said column;~~ and

an electric-charge detection unit which is provided in correspondence with ~~for every~~ two of said column electric-charge transfer units ~~columns~~ and which converts said signal electric-charges charge transferred by ~~said~~ each corresponding column electric-charge transfer unit into a pixel signal, wherein

said electric-charge detection unit includes a selective gate which is provided independently for each of said two adjacent column electric-charge transfer units ~~columns~~ ~~for reading out said signal electric-charge on the input side of said signal electric-charge.~~

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14. (Currently Amended) The solid state image sensor according to claim 1, wherein

each of said electric-charge detection units includes a reset gate ~~in said electric-charge detection unit to be initialized after said signal electric-charge is converted into said pixel signal.~~

15. (Currently Amended) The solid state image sensor according to claim 2, wherein

each of said electric-charge detection units includes a reset gate ~~in said electric-charge detection unit to be initialized after said signal electric-charge is converted into said pixel signal.~~

16. (Currently Amended). The solid state image sensor according to claim 6, wherein

each of said electric-charge detection units includes a reset gate ~~in said electric-charge detection unit to be initialized after said signal electric-charge is converted into said pixel signal.~~

17. (Currently Amended) The solid state image sensor according to claim 13, wherein

each of said electric-charge detection units includes a reset gate ~~in said electric-charge detection unit to be initialized after said signal electric-charge is converted into said pixel signal.~~

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18. (Currently Amended) The solid state image sensor according to claim 1, wherein further comprising:

~~a differential detection unit which detects the difference between the output without said signal electric charge and the signal level with said signal electric charge, of said pixel signal, is provided subsequently to said electric charge detection unit.~~

19. (Currently Amended) The solid state image sensor according to claim 2, wherein further comprising:

~~a differential detection unit which detects the difference between the output without said signal electric charge and the signal level with said signal electric charge, of said pixel signal, is provided subsequently to said electric charge detection unit.~~

20. (Currently Amended) The solid state image sensor according to claim 6, wherein further comprising:

~~a differential detection unit which detects the difference between the output without said signal electric charge and the signal level with said signal electric charge, of said pixel signal, is provided subsequently to said electric charge detection unit.~~

21. (Currently Amended) The solid state image sensor according to claim 13, wherein further comprising:

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~~a differential detection unit which detects the difference between the output without said signal electric charge and the signal level with said signal electric charge, of said pixel signal, is provided subsequently to said electric charge detection unit.~~

22. (Currently Amended) The solid state image sensor according to claim 1, further comprising:

~~a plurality of said electric charge detection units with respect to said plurality of adjacent columns in the direction of said column with said plurality of columns as a group, and~~

~~a horizontal scanning unit subsequent to said plurality of electric charge detection units, which sequentially selects and outputs said pixel signal that is output from each of said plurality of electric-charge detection units in time series in the direction of said row.~~

23. (Currently Amended) The solid state image sensor according to claim 2 further comprising:

~~a plurality of said electric charge detection units with respect to said plurality of adjacent columns in the direction of said column with said plurality of columns as a group, and~~

~~a horizontal scanning unit subsequent to said plurality of electric charge detection units, which sequentially selects and outputs said pixel signal that is output from each of said plurality of electric-charge detection units in time series in the direction of said row.~~

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24. (Currently Amended) The solid state image sensor according to claim 6 further comprising:

~~a plurality of said electric-charge detection units with respect to said plurality of adjacent columns in the direction of said column with said plurality of columns as a group, and~~

~~a horizontal scanning unit subsequent to said plurality of electric-charge detection units, which sequentially selects and outputs said pixel signal that is output from each of said plurality of electric-charge detection units in time series in the direction of said row.~~

25. (Currently Amended) The solid state image sensor according to claim 13 further comprising:

~~a plurality of said electric-charge detection units with respect to said plurality of adjacent columns in the direction of said column with said plurality of columns as a group, and~~

~~a horizontal scanning unit subsequent to said plurality of electric-charge detection units, which sequentially selects and outputs said pixel signal that is output from each of said plurality of electric-charge detection units in time series in the direction of said row.~~

26. (Currently Amended) A drive method ~~of~~ for a solid state image sensor, in which a pixel signal is obtained from a the solid state image sensor comprising: ~~that includes a column electric-charge transfer unit which transfers signal electric-charge obtained by photo-conductive units arranged in each~~

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~~direction of the row and the column in the two-dimensional shape
in the direction of said column, and~~

~~an electric-charge detection unit which is provided for
every plurality of said adjacent columns and which converts said
signal electric-charge transferred by said column electric-charge
transfer unit in the direction of said column into a pixel
signal, wherein~~

~~— said solid state image sensor is driven such that said pixel
signal with respect to each of said plurality of said adjacent
columns is output with a different phase when said signal
electric-charge is transferred in the direction of said columns
transferring electric-charge in a column direction via a
plurality of column electric-charge transfer units; and~~

~~— converting signal electric-charge transferred by each
corresponding column electric-charge transfer unit into a pixel
signal via an electric-charge detection unit which is provided in
correspondence with a plurality of adjacent column electric-
charge transfer units; and~~

~~— wherein signal electric-charge obtained by a photo-
conductive unit at a same row position transferred by
corresponding column electric-charge transfer units for a
electric-charge detection unit reaches said corresponding
electric-charge detection unit at a different vertical transfer
time.~~

27. (Currently Amended) The drive method according to claim
26, comprising: wherein

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driving said column electric-charge transfer unit ~~is driven~~
by six-phase drive.

28. (Currently Amended) The drive method according to claim
26, wherein

said electric-charge detection unit includes ~~on the input~~
a selective gate ~~for reading out said signal electric-~~
~~charge~~, and

a reset gate ~~for initializing after said signal electric-~~
~~charge is converted into said pixel signal~~, and

said reset gate is made to turn on when said selective gate
is off.

Claims 29-30. (Canceled)

31. (Canceled).